PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BOARD OF PATENT APPEALS AND INTERFERENCES

In re application of :	THIELERT - 3 PCT	
Serial No.:	10/520,853	Examiner: MATTHEW J. MERKLING
Filed:	JANUARY 10, 2005	Group: 1795
For:	FISSION REACTOR FOR A CLAUS PLANT	

MAILSTOP: APPEAL BRIEF
Hon. Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

APPEAL BRIEF

Dear Commissioner:

In accordance with the provisions of 37 C.F.R. 41.37(c), the following items under appropriate headings are provided for this appeal from the final rejection of claims 1-2 and 4-7 dated October 26, 2009.

REAL PARTY IN INTEREST

The real party in interest is the assignee, Uhde GmbH.

RELATED APPEALS AND INTERFERENCES

There are no other appeals, interferences, or judicial proceedings known to Appellant, the Appellant's legal representatives or Assignee which may be related to, directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

STATUS OF CLAIMS

Claims 1-2 and 4-7 are in the application. Claim 3 has been canceled without prejudice. Claims 1-2 and 4-7 were finally rejected in an Office Action dated October 26, 2009. No claims have been allowed. The appealed claims are 1-2 and 4-7.

STATUS OF AMENDMENTS

No amendment has been filed after the Examiner issued the October 26, 2009 Office Action. A Response to Final Office Action without an amendment was filed on January 26, 2010 in response to the October 26, 2009 Final Office Action and was deemed by the Examiner in an Advisory Action, dated February 16, 2010, not to place the application in condition for allowance.

SUMMARY OF CLAIMED SUBJECT MATTER

The present invention is described below with reference numbers from the drawings and page and line numbers from the specification. Such reference numbers and citations to the specification are for illustration only and are not intended to limit the claims.

As shown in FIGS. 1 and 2, the present invention as set forth in independent claim

1 provides a fission reactor 1 for a Claus plant. See, e.g. FIGS. 1 and 2, Specification, page 1, first full paragraph (page 1, lines 1-7), page 2, second full paragraph (page 2, lines 16-19), and paragraph bridging pages 5 and 6 (page 5, lines 4-8). The fission reactor 1 includes a boiler 9 lined with refractory material. See, e.g. FIG. 1, Specification, page 1, first full paragraph (page 1, lines 1-7), paragraph bridging pages 3 and 4 (page 3, lines 1-7), paragraph bridging pages 6 and 7 (page 6, lines 3-8).

As recited in claim 1, the boiler 9 includes a combustion chamber 2 having an inflow opening 12 for a mixture of heating gas, air, and acid gas containing H_2S. See, e.g. FIGS. 1 and 2, Specification, page 1, first full paragraph (page 1, lines 1-7), paragraph bridging pages 3 and 4 (page 3, lines 14-18), and paragraph bridging pages 6 and 7 (page 6, lines 3-11).

As recited in claim 1, the boiler 9 further includes a catalyst chamber 10 having a catalyst bed 3 of a loose catalyst bulk material. See, e.g. FIGS. 1 and 2, Specification, page 1, first full paragraph (page 1, lines 1-7), page 2, first full paragraph (page 2, lines 6-9), paragraph bridging pages 3 and 4 (page 3, lines 1-7), paragraph bridging pages 5 and 6 (page 5, lines 4-8), and paragraph bridging pages 6 and 7 (page 6, lines 3-8).

As recited in claim 1, the boiler 9 further includes an outflow-side chamber 11 having a gas outlet 13 for hot process gas containing elemental sulfur. See, e.g. FIGS. 1 and 2, Specification, page 1, first full paragraph (page 1, lines 1-7), paragraph bridging pages 3 and 4 (page 3, lines 1-9), and paragraph bridging pages 6 and 7 (page 6, lines 3-11).

As recited in claim 1, the boiler 9 is configured as a horizontal, cylindrical boiler with the combustion chamber 2, the catalyst chamber 10, and the outflow-side chamber 11 being disposed next to one another. See, e.g. FIGS. 1 and 2, Specification, paragraph bridging pages 3 and 4 (page 3, lines 1-7), and paragraph bridging pages 6 and 7 (page 6, lines 3-8).

As recited in claim 1, the catalyst chamber 10 is delimited on both sides, in the flow direction, by a plurality of gas-permeable checker bricks 14 containing elongated holes. See, e.g. FIGS. 1 and 2, Specification, paragraph bridging pages 3 and 4 (page 3, lines 1-7, and 9-18, and page 3, line 20 to page 4, line 2), and paragraph bridging pages 6 and 7 (page 6, lines 11-15).

As recited in claim 1, the catalyst chamber 10 has a mantle-side fill opening 15 disposed between the gas-permeable checker bricks 14 for introducing the catalyst bed 3. See, e.g. FIG. 2, Specification, paragraph bridging pages 3 and 4 (page 3, lines 1-7 and 9-13), and paragraph bridging pages 6 and 7 (page 6, lines 11-14).

Claim 2 is dependent on claim 1 and specifies that the inflow opening 12 of the combustion chamber 2 and the gas outlet 13 of the outflow-side chamber 11 are disposed on opposite faces of the boiler 9. See, e.g. FIG. 2; Specification, paragraph bridging pages 3 and 4 (page 3, lines 8-9), and, paragraph bridging pages 6 and 7 (page 6, lines 8-11).

Claim 4 is dependent on claim 1 and specifies that a branch line 16 lined with

refractory material is connected on the circumference of the outflow-side chamber 11. See, e.g. FIG. 2; Specification, page 4, first full paragraph (page 4, lines 3-7), and paragraph bridging pages 6 and 7 (page 6, lines 15-18). The branch line 16 opens into a process gas line 17 adjacent to the boiler 9. See, e.g. FIGS. 1 and 2; Specification, page 4, first full paragraph (page 4, lines 3-7), and paragraph bridging pages 6 and 7 (page 6, lines 15-18). A valve body 18 is disposed in adjustable manner in an opening region of the branch line 16 into the process gas line 17. See, e.g. FIG. 2; Specification, page 4, first full paragraph (page 4, lines 7-10), and paragraph bridging pages 6 and 7 (page 7, lines 3-6). The amount flow of a hot gas stream exiting from the branch line 16 can be regulated with the valve body 18. See, e.g. FIG. 2; Specification, page 4, first full paragraph (page 4, lines 7-10), and paragraph bridging pages 6 and 7 (page 7, lines 3-6). A cooler process gas passing through the process gas line 17 cools the valve body 18 and cools a setting device 19 assigned to the valve body 18. See, e.g. FIG. 2; Specification, page 4, first full paragraph (page 4, lines 10-14), and paragraph bridging pages 6 and 7 (page 7, lines 6-9).

Claim 5 is dependent on claim 4 and specifies that the fission reactor 1 further includes a waste heat boiler 4 connected with the gas outlet 13. See, e.g. FIG. 1; Specification, paragraph bridging pages 1 and 2 (page 1, line 16 to page 2, line 1), and paragraph bridging pages 5 and 6 (page 5, lines 3-8). The hot process gas exiting from the boiler 9 is cooled in the waste heat boiler 4 for condensation of elemental sulfur. See, e.g. FIG. 1; Specification, paragraph bridging pages 1 and 2 (page 1, line 16 to page 2, line 1) and paragraph bridging pages 5 and 6 (page 5, lines 12-15). Steam is generated in the waste heat boiler 4. See, e.g. FIG. 1; Specification, paragraph bridging pages 7 and 8

(page 7, lines 13-20). The branch line 16 opens into a process gas line 17. See, e.g. FIGS. 1 and 2; Specification, page 4, first full paragraph (page 4, lines 3-7), and paragraph bridging pages 6 and 7 (page 6, lines 15-18). The process gas line 17 is connected with the waste heat boiler 4 and passes the cooled process gas to a catalyst stage 5 of the Claus plant. See, e.g. FIG. 1; Specification, paragraph bridging pages 1 and 2 (page 2, lines 2-5), paragraph bridging pages 5 and 6 (page 5, lines 12-20), paragraph bridging pages 6 and 7 (page 6, line 18 to page 2, line 1).

Claim 6 is dependent on claim 4 and specifies that the valve body 18 and the setting device 19 consist of metallic material. See, e.g. FIG. 2; Specification, page 4, first full paragraph (page 4, lines 10-14), and paragraph bridging pages 6 and 7 (page 7, lines 6-9).

Claim 7 is dependent on claim 1, and specifies that the mantle-side fill opening 15 includes a flange tube. See, e.g. FIG. 2; Specification, paragraph bridging pages 3 and 4 (page 3, lines 4-7).

GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

1. The rejection of claims 1, 2, and 7 under 35 U.S.C. §103(a) as being unpatentable over *Luinstra et al. GB 2221853 A* in view of *Bartz et al. U.S. Patent No. 5,494,003* and *Harris U.S. Patent No. 5,921,079* was in error.

2. The rejection of claims 4 and 5 under 35 U.S.C. §103(a)

as being unpatentable over *Luinstra et al.* in view of *Bartz et al.* and *Harris* and further in view of *Wunderlich et al. U.S. Patent No. 3,822,337* was in error.

3. The rejection of claim 6 under 35 U.S.C. §103(a) as being unpatentable over *Luinstra et al.* in view of *Bartz et al.*, *Harris*, and *Wunderlich et al.* and further in view of *Nobuhiro et al. JP 06-200354* was in error.

ARGUMENT

The Rejection of Claims 1- 2 and 7 under 35 U.S.C. §103(a) as Being Unpatentable Over *Luinstra et al. GB 2221853 A* in View of *Bartz et al. U.S. Patent No. 5,494,003* and *Harris U.S. Patent No. 5,921,079* Was in Error.

As to independent claim 1 and claims 2 and 7, which depend from claim 1, the Examiner has based his rejection under 35 U.S.C. §103(a) on *Luinstra et al.* in view of *Bartz et al.* and *Harris.*

According to the Examiner, *Luinstra et al.* discloses at FIG. 1, page 4, lines 32-33, and page 5, lines 16-18 the fission reactor recited in Appellant's claims 1-2 and 7 except for (1) a plurality of gas-permeable check bricks containing elongated holes delimitating both sides of the catalyst chamber in the flow direction as recited in claim 1, (2) a mantle-side fill opening disposed between the gas-permeable checker bricks for introducing the catalyst bed as recited in claim 1, and (3) a mantle-side fill opening comprising a flange tube as recited in claim 7. See the paragraph bridging pages 2-3, the first and fifth full paragraphs of page 3, and the third full paragraph of page 4 of the

October 26, 2009 Final Office Action.

The Examiner has taken the position that *Bartz et al.* discloses at col. 1, lines 29-33 utilizing screens in high temperature services in infrared burners and teaches at col. 2, lines 2-8 using what the Examiner calls "a perforated ceramic plate/checkered brick" in place of a screen when used in high temperature service in a water heater in order to improve durability and prevent the problems associated with screens in high temperature service such as warping. The Examiner has also taken the position that the ceramic material of *Bartz et al.* includes a plurality of holes in a checker pattern and therefore meets the "checker brick" limitation of claim 1. February 16, 2010 Advisory Action. The Examiner asserts that it would have been obvious to one of ordinary skill in the art to replace the vertical screens arranged on each side of a layer of catalyst particles of *Luinstra et al.* with the perforated ceramic plate/checkered brick of *Bartz et al.* in order to improve durability and prevent the problems associated with screens in high temperature service such as warping. See the second, third, and fourth paragraphs of page 3 of the October 26, 2009 Final Office Action.

The Examiner has cited *Harris* as disclosing in the Abstract and FIG. 1 a cylindrical reaction vessel in which a catalyst is placed and teaching at col. 5, lines 26-33 a mantle side fill opening 55 which is sealed with a flange 57 and is placed in the shell in order to facilitate catalyst removal and replacement of the catalyst contained inside. The Examiner has taken the position that it would have been obvious to one of

ordinary skill in the art to add the mantle-side fill opening and sealing flange of *Harris* to the apparatus of *Luinstra et al.* as modified by *Bartz et al.* between the checker bricks in order to facilitate removal and replacement of the catalyst of *Luinstra et al.* See paragraphs 1 and 2 of page 4 of the October 26, 2009 Final Office Action.

As the Examiner has recognized, his hypothetical apparatus constructed from the combination of *Luinstra et al.*, *Bartz et al.*, and *Harris* fails to disclose a plurality of gas-permeable checkered bricks on each side of the catalyst chamber. The Examiner has asserted, however, that for purposes of maintenance and assembly, it would have been obvious to one of ordinary skill in the art to make the checker brick structure of the apparatus of *Luinstra* as modified by *Bartz et al.* and *Harris* separable "in order to facilitate removal of the checker bricks through the small openings of the fission reactor (see FIG. 1 of *Luinstra* which shows that a single checker brick on either side of the catalyst chamber (13) would not be able to be removed through the smaller openings on either end of the fission reactor)."

It is respectfully submitted that, contrary to the Examiner's position, a fission reactor for a Claus plant as recited in Appellant's claim 1 is not obvious in view of *Luinstra et al.*, *Bartz et al.*, and *Harris*.

As set forth in claim 1, Appellant's invention provides a fission or splitting reactor for a Claus plant having a boiler (9) lined with refractory material, a catalyst chamber,

and an outflow-side chamber having a gas outlet 13 for hot process gas that contains elemental sulfur. The boiler has a combustion chamber (2) having an inflow opening (12) for a mixture of heating gas, air and acidic gas containing H_2S. The catalyst chamber (10) has a catalyst bed (3) of a **loose catalyst bulk material**, wherein the catalyst chamber (10) is delimited, on both sides, in the flow direction, by **a plurality of** gas-permeable checker bricks (14) containing elongated holes. A mantle-side fill opening (15) is disposed between the gas-permeable checker bricks (14) for ***introducing the catalyst bed (3)***.

The mantle-side fill opening (15) permits the catalyst chamber (10), which is delimited on both sides, with the gas-permeable checker bricks, to be equipped with the catalyst bed or to perform an exchange if necessary.

The delimitation walls of the catalyst chamber are **not** the usual porous bricks or refractory bricks, but rather as recited in claim 1 are checker bricks that are gas permeable and contain elongated holes. This feature is important and by no means trivial because usual porous bricks would become "plugged up" if loose bulk material such as catalyst pellets in spherical shape is used as the catalyst bed because the catalyst pellets lie against the edge of the bricks and can plug the pores up, in whole or in part. Such plugging up significantly restricts the functioning of the catalyst if not actually completely prevents such functioning. Furthermore, there is a risk that the hot mixture of the heating gas, the air, and the H_2S will no longer be able to flow through

the catalyst chamber without hindrance or at all, so that dangerous overheating phenomena are or can be the consequence.

Appellant's invention as recited in claim 1 counters these problems by delimiting the catalyst on both sides of the chamber by gas-permeable checker bricks, not simply porous bricks. The checker bricks are equipped with elongated holes which are not plugged up by the spherical pellets of the catalyst bed so no danger exists from such plugging up. Therefore, the hot-gas mixture to be produced can flow through the bed without any problems. In addition, the checker bricks assure reliable separation of the catalyst chamber from the other process chambers and thus prevent damage to the catalyst.

As recited in claim 1, the catalyst bed, which is defined as loose catalyst bulk material, is introduced through the mantle-side fill opening (15). Accordingly, the catalyst directly abuts against the permeable checker bricks (14), wherein, when the catalyst bed is replaced, the old loose catalyst bulk material is removed and new or regenerated loose catalyst bulk material is poured through the mantle-side fill opening into the catalyst chamber. Hence, it is respectfully submitted that claim 1 clearly defines that the catalyst bed is not provided as a compact element.

The primary reference to *Luinstra et al.* discloses a splitting reactor for a Claus system in which a boiler lined in refractory manner is disposed, with a combustion chamber, a catalyst chamber, and a chamber on the outflow-side lying next to one

another. *Luinstra et al.*, however, fails to disclose or suggest loose catalyst bulk material delimited by checker bricks on each side. Instead a catalyst structure is described that is referred to as a whole as being rigid and permeable. See, for example, the third full paragraph on page 3 of *Luinstra et al.* Although the Examiner has taken the position that *Luinstra et al.* discloses at page 5, lines 16-18 an embodiment that comprises a layer of catalyst particles arranged between vertical screens, *Luinstra et al.* characterizes this layer as a "rigid permeable catalyst structure," and nothing in *Luinstra et al.* indicates that this layer can be a loose and uncompacted element.

It is respectfully submitted that a person skilled in the art derives from *Luinstra et al.* that the catalyst is supposed to be configured as a type of catalyst mat or as a catalyst insert, whereby the mat or the insert is supposed to be inserted into the boiler as a complete unit (a "rigid permeable catalyst structure"). A catalyst chamber that is delimited on both sides by a plurality of gas-permeable checker bricks that have oblong holes, whereby the interstice formed between the bricks is filled with a loose fill of catalyst material and whereby the loose fill can be filled in through a fill-in opening between the checker bricks, as is provided with Appellant's reactor as recited in claim 1, is nowhere disclosed or suggested in *Luinstra et al.* In addition, this configuration according to Appellant's claim 1 is nowhere disclosed or suggested taking any of the other prior art cited by the Examiner into consideration either.

With respect to the disclosure of *Luinstra et al.,* the Examiner has taken the position that the term "rigid permeable catalyst structure" does not necessarily mean that the catalyst itself is rigid but rather that the catalyst **structure** is rigid. See the Response to Arguments section on page 7 of the October 26, 2009 Final Office Action. Even if the Examiner's position were correct, *Luinstra et al.* nevertheless discloses only a rigid catalyst structure which is provided as a compact element and which is placed as a single element inside the furnace. See page 5, lines 25-27 of *Luinstra et al.* Against this background, it is respectfully submitted that a person skilled in the art would always replace the complete rigid permeable catalyst structure of *Luinstra et al.* as a whole during maintenance.

Moreover, as recognized by the Examiner, *Luinstra et al.* also fails to disclose or suggest the use of any checker brick. See page 3 first full paragraph of the October 26, 2009 Final Office Action.

The defects and deficiencies of the primary reference to *Luinstra et al.* are nowhere remedied by the secondary reference to *Bartz et al.* Like *Luinstra et al.*, *Bartz et al.* fails to disclose or suggest a catalyst chamber that is delimited on both sides by a plurality of gas-permeable checker bricks that have elongated holes, where the space formed between the bricks is filled with a loose fill of catalyst material and where the loose catalyst material fill can be filled in through a fill-in opening between the checker

bricks. *Bartz et al.* relates to a vertically built water boiler that includes an infrared burner having a single ceramic plate 16 towards the bottom of the water heater.

Bartz et al. concerns itself with the problem of providing a water boiler having an infrared burner, whose waste gases comprise only small proportions of NO_x. The water boiler is oriented perpendicularly and vertically (see FIGS. 1 and 2 and column 1, line 58 of *Bartz et al.*), whereby the combustion of gas and combustion air takes place directly at a perforated ceramic plate 16 (see column 1, lines 60-64 of *Bartz et al.*) that is consequently part of the burner and is exposed to a very high heat load, which it is respectfully submitted is not comparable to the heat load downstream with respect to a combustion chamber of a fission reactor for a Claus plant. The ceramic plate 16 of the water heater of *Bartz et al.* is a circular disk that fills the entire inside diameter of a lower metal skirt 15 (see column 2, lines 53 to 56 of *Bartz et al.*). This perforated ceramic plate 16 is inserted into the skirt 15 from below, and attached by means of a circumferential ring 22, using bolts that are not shown in the drawing (see column 4, lines 5 to 7 of *Bartz et al.*).

Thus, *Bartz et al.* refers to a special configuration of a **burner** in a **vertically oriented water boiler** in which a single disk that fills the entire diameter of the burner is attached by means of a clamping ring. Therefore, it is respectfully submitted that *Bartz et al.*'s arrangement is foreign to the type of system to which Appellant's claim 1 is directed, so that a person skilled in the art would have no recognizable reason for

taking out and transferring individual characteristics of *Bartz et al.* into a fission reactor for a Claus plant.

It is also respectfully submitted that the Examiner's position that a "ceramic plate" as taught by *Bartz et al.* is the equivalent of "checker bricks" according to Appellant's claim 1 (see the third and fourth paragraphs of page 3 (page 3, lines 9-16) of the October 26, 2009 Final Office Action) is entirely unjustified. These two terms relate to completely different materials with different properties and dimensions. According to *Bartz et al.,* the ceramic burner plate 16, which can be perforated, comprises a thickness of about 0.5 inch (see column 2, line 24 of *Bartz et al.*), fills the entire inside diameter of a lower metal skirt (see column 2, lines 53-56 of *Bartz et al.*), and is usually made by casting (see column 2, lines 29-34 of *Bartz et al.*). Perforation of the ceramic plate of *Bartz et al.* can be carried out by drilling the ceramic sheet or by impressing during the casting operation (see column 2, lines 29-34 of *Bartz et al.*). In contrast, gas permeable checker bricks are thicker than a ceramic plate.

There is no disclosure or suggestion in *Bartz et al.* that would lead one skilled in the art to use gas permeable checker bricks as recited in Appellant's claim 1 instead of the ceramic plate taught by *Bartz et al.*

In any event, it is respectfully submitted that a water boiler for household use is simply not comparable with a boiler of a large technical Claus system. A Claus system

involves industrial devices on a large technical scale, which it is respectfully submitted cannot easily be compared with an apparatus such as a water heater, e.g. the water heater disclosed in *Bartz et al.*, that is typically used on a much smaller scale and is used in a home or residence. Accordingly, it is respectfully submitted that a person skilled in the art would not readily consider transferring individual characteristics of *Bartz et al.* into a Claus system.

Even if *Bartz et al.* were to be looked at in connection with modifying *Luinstra et al.*, which is respectfully submitted would not be done, a person skilled in the art would at most consider using a rigid, permeable catalyst structure (see *Luinstra et al.* at page 5, lines 16 to 18) in which round disk perforated ceramic plates that fill the entire inner diameter of the boiler are used on vertical screens. It is respectfully submitted that a person skilled in the art would receive no inspiration to delimit the catalyst chamber of *Luinstra et al.*, on both sides, with a plurality of gas permeable checker bricks that have elongated holes and, in addition, to provide a catalyst bed of a loose material that is separate from these chamber bricks as recited in Appellant's claim 1.

Although the Examiner has taken the position at page 8 of the October 26, 2009 Final Office Action that one of skilled in the art would recognize that the screens in the high temperature combustion atmosphere of *Luinstra et al.* would be subject to the same weakness as the screen in the high temperature service of *Bartz et al.* and therefore would be motivated to remove the screens of *Luinstra et al.* and "replace them

with the more stable ceramic plate/checkered brick" of *Bartz et al.*, it is respectfully submitted that the Examiner's position is unfounded.

Starting from *Luinstra et al.*, a person skilled in the art would be taught to place the rigid permeable catalyst structure near the outlet of the reaction furnace, where the temperature is expected to be lower. This placement is suggested by *Luinstra et al.* because the life of the ***catalyst*** will likely be longer at lower temperatures (see page 5, lines 25-28 of *Luinstra et al.*), which means that the catalyst itself is the most temperature sensitive element of the rigid permeable catalyst structure. There is no disclosure or suggestion in *Luinstra et al.* that would lead a person skilled in the art to care about the material of the vertical screens with respect to an embodiment comprising a layer of catalyst particles arranged between vertical screens. See page 5, lines 16-18 of *Luinstra et al.*

Moreover, combining *Luinstra et al.* with isolated features from the secondary reference to *Bartz et al.* would not be obvious to a person skilled in the art because as stated above *Bartz et al.* concerns itself with the completely different problem of providing a water boiler having an infrared burner, whose waste gases comprise only small proportions of NO_x. Moreover, the water boiler is oriented perpendicularly which teaches away from *Luinstra et al.*'s arrangement, and the combustion of gas and combustion air takes place directly at a perforated ceramic plate, not a "checkered

brick" as asserted by the Examiner, that is part of the burner, and is not part of a catalyst chamber.

The additional secondary reference to *Harris* relates to an emission control apparatus, wherein a rigid catalyst structure (FIGS. 1 and 3 of *Harris*) can be replaced through a mantle-side fill opening.

None of these references (*Luinstra et al.*, *Bartz et al.*, and *Harris*) discloses or suggests providing a loose catalyst bulk material between walls of permeable checker bricks, wherein the catalyst bed, **i.e. the loose catalyst bulk material**, can be introduced through a mantle-side fill opening. According to *Luinstra*, *Bartz et al.*, and *Harris*, any catalyst structure to be used is always a compact rigid permeable catalyst structure, and of these prior art references only *Harris* discloses the replacement of such a rigid permeable catalyst structure.

Accordingly, it is respectfully submitted that *Luinstra et al.* in combination with *Bartz et al.* and *Harris* cannot lead a person skilled in the art to Appellant's fission reactor for a Claus plant as recited in claim 1.

Thus, it is respectfully submitted that independent claim 1 and claims 2 and 7, each of which depend directly from claim 1, are patentable over the cited references.

It is respectfully submitted, moreover, that the Examiner incorrectly relied on hindsight for the obviousness rejections of claims 1-2 and 7 based on the combination of *Luinstra et al.*, *Bartz et al.*, and *Harris*.

A claimed invention is unpatentable if the differences between it and the prior art "are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art . . . .". 35 U.S.C. §103(a). The phrase "at the time the invention was made" guards against entry into the tempting but forbidden zone of hindsight.

To prevent the use of hindsight based on the invention to defeat patentability of the invention, the Examiner must show reasons that the skilled artisan, confronted with the same problems as the inventor and with no knowledge of the claimed invention, would select the elements from the cited prior art references or combination in the manner claimed. In re Roufflet, 47 U.S.P.Q.2d 1453, 1457-58 (Fed. Cir. 1998).

As indicated by the Federal Circuit in Roufflet:

> "If identification of each claimed element in the prior art were sufficient to negate patentability, very few patents would ever issue. Furthermore, rejecting patents solely by finding prior art corollaries for the claimed elements would permit an Examiner to use the claimed invention itself as a blueprint for piercing together elements in the prior art to defeat the patentability of the claimed invention. Such an approach would be 'an illogical and inappropriate process by which to determine patentability.'"

47 U.S.P.Q.2d at 1457 (citation omitted).

It is respectfully submitted that in taking the position that *Luinstra et al.* in combination with *Bartz et al.* and *Harris* teaches one skilled in the art to change *Luinstra et al.*'s rigid permeable catalyst structure for a Claus plant comprising a layer of particles arranged between vertical screens so that (1) a loose catalyst bulk material is delimited on both sides by the perforated ceramic plate used horizontally in the water heater burner of *Bartz et al.* and (2) the ceramic plate on each side is provided with elongated holes instead of being an about 0.5-inch thick ceramic sheet drilled with small holes, and (3) to further modify *Luinstra et al.*'s Claus reactor furnace by adding a side opening used by *Harris* to replace a catalytic module as a unit, the Examiner is engaging in an impermissible retrospective view with knowledge of the invention in which the Examiner disregards the teachings of *Luinstra et al.* to use a rigid permeable catalyst structure to facilitate the conversion of organic sulfur compounds (*Luinstra et al.*, page 4, lines 12-18), of *Harris* to replace a catalytic module as a whole, and of *Bartz et al.* to use a single 0.5 inch-thick perforated ceramic burner plate fitted into a metal skirt spaced from the bottom of a water tank (*Bartz et al.* col. 4, lines 49-62).

Contrary to the Examiner's position, it is respectfully submitted that one skilled in the art would have no reason to disregard *Luinstra et al.*'s teaching to use the rigid permeable catalyst structure as none of the cited references teach the desirability of using loose catalyst bulk material delimited on both sides with a plurality of gas-permeable checker bricks containing elongated holes. *Luinstra et al.*'s rigid permeable catalyst structure is provided as a compact element which is placed as a single element

inside the furnace. No catalyst is described in *Bartz et al.* and as only a single disk is used, *Bartz et al. a fortiori* describes no interstice between disks for loose catalyst bulk material. In *Harris*, a rigid catalyst structure (catalyst module 50) is described (*Harris*, col, 5, lines 26-33).

The Examiner has the burden under 35 U.S.C. § 103(a) to establish a prima facie case of obviousness. This burden can be satisfied only by showing some objective teaching of the prior art, or knowledge generally available to one of ordinary skill in the art, that would lead that individual to modify the reference in the manner suggested by the Examiner. This the Examiner has not done.

It is respectfully submitted that there is no suggestion in any of the references that *Luinstra et al.*'s rigid permeable catalyst structure was inadequate or should be modified in any way, let alone changed to one in which loose catalyst bulk material is delimited on both sides by a plurality of checker bricks containing elongated holes as suggested by the Examiner. To the contrary, *Luinstra et al.* teaches away from using loose bulk catalyst material by using a rigid permeable catalyst structure. *Bartz et al.* discloses a water heater in which the use of loose bulk catalyst material delimited between checker bricks having elongated holes is nowhere disclosed or suggested. *Harris* discloses an emission control apparatus for an internal combustion engine in which a catalytic module 50 may be removed for repair or replacement as a unit.

Although *Bartz et al.* indicates that a ceramic plate has several advantages over metal screens, even if one skilled in the art were motivated to replace the screens of *Luinstra et al.* with a ceramic plate, one still would have no motivation to use loose bulk catalyst material introduced through a mantle-side fill opening disposed between gas-permeable check bricks containing elongated holes.

Although *Harris* discloses a side opening for removal and replacement of the catalytic module, there is no disclosure or suggestion of simply replacing the catalyst inside the module with loose bulk catalyst material introduced through this side opening.

Rejection of claims based on a combination of references cannot be predicted on mere identification in the prior art references of individual components of claimed inventions. Rather, particular findings must be made as to the reason the skilled artisan, with no knowledge of the claimed invention, would have selected these components for combination in the manner claimed. Broad, conclusory statements standing alone are insufficient. In re Kotzal, 55 U.S.P.Q.2d , 1313, 1317 (Fed. Cir. 2000).

Thus, although the Examiner has taken the position that one skilled in the art would have been motivated to combine *Luinstra et al.* and *Bartz et al.* "to replace the high temperature warping-prone screens with a more durable ceramic checker brick" (February 16, 2010 Advisory Action), no explanation has been provided as to the

reason one skilled in the art would modify the rigid permeable catalytic structure of *Luinstra et al.* so that the loose catalytic bulk material could be introduced separately from the ceramic plate. Similarly, the Examiner's position that one skilled in the art would have added a mantle side fill opening between the ceramic plates in order to add loose bulk catalyst is entirely unfounded given that the *Harris* catalytic module is a rigid unit, replaceable as a whole.

Accordingly, it is respectfully submitted that there is nothing in *Luinstra et al.*, *Bartz et al*, and *Harris* that would lead one skilled in the art to make the modification proposed by the Examiner and doing so would still not result in Appellant's fission reactor for a Claus plant as recited in claim 1.

Accordingly, it is respectfully submitted that the rejection of claim 1 and dependent claims 2 and 7 on the basis of obviousness over the combination of *Luinstra et al.*, *Bartz et al*, and *Harris* was in error and should be reversed.

The Rejection of Claims 4 and 5 Under 35 U.S.C. §103(a) as Being Unpatentable Over *Luinstra et al.* in View of *Bartz et al.* and *Harris* and Further in View of *Wunderlich et al. U.S. Patent No. 3,822,337* Was in Error.

As to dependent claims 4 and 5, claim 4 depending from claim 1 and claim 5 depending from claim 4, the Examiner has based his rejection under 35 U.S.C. §103(a) on a combination of *Luinstra et al.* in view of *Bartz et al.* and *Harris* with the further reference *Wunderlich et al.*, citing *Wunderlich et al.* as disclosing a fission reactor for a

Claus plant having "a branch line (52) lined out from an outflow size of the discharge chamber (203a) and joins in with a process stream (at 215), with a valve body (54) where the amount of hot gas can be regulated and the cooler process gas passes through the process gas line (after a waste heat boiler 212) which generates steam, and passes the cooler process gas to the catalyst stage (Claus oven)." October 26, 2009 Final Office Action, page 5. According to the Examiner, *Wunderlich et al.* (col. 7, lines 53-56 and col. 8, lines 72-75) teaches this configuration in order to control the temperature of the process gas stream to make it suitable for the downstream Claus reaction processes.

The Examiner has taken the position that it would have been obvious to one of ordinary skill in the art to add the branch line, valve and the waste heat boiler of *Wunderlich et al.* to the fission reaction apparatus of *Luinstra et al.* as modified by *Bartz et al.* and *Harris* in order to control the temperature of the process gas stream to make it suitable for the downstream Claus reaction processes.

The Examiner has also considered that *Wunderlich et al.* shows a Claus plant within the meaning of the claims because "there is nothing in the claim that limits 'Claus plant' to the type of Claus plant that is disclosed in the specification." February 16, 2010 Advisory Action.

The Examiner also has taken the position that the valve of *Wunderlich et al.* will

inherently be cooled by the process gas due to its close proximity to the process gas (such as by radiation) as nothing in the claim is said to state that the flow of the gas contacts the valve. February 16, 2010 Advisory Action.

The Examiner has also disregarded the recitations in claim 4 that were considered "directed to a manner of operating disclosed system," citing MPEP § §2114 and 2115 and Ex parte Thibault, 164 U.S.P.Q. 666, 667 (Bd. App. 1969).

Luinstra et al., *Bartz et al.*, and *Harris* have been discussed above, and it is respectfully submitted that the arguments with respect to *Luinstra et al.*, *Bartz et al.*, and *Harris* in connection with claim 1 on which claims 4 and 5 directly or indirectly depend apply equally to the combination of *Luinstra et al.*, *Bartz et al.*, and *Harris* with *Wunderlich et al.*

In addition, it is respectfully submitted that claims 4 and 5 are patentable over the prior art references cited by the Examiner for the following reasons.

Claim 4 is dependent on claim 1 and further specifies that the outflow-side chamber (11) of the boiler (9) for the ***Claus process*** is connected to a branch line (16) lined with refractory material, which opens into a process gas line (17) adjacent to the boiler (9). **In the opening region** of the branch line (16), a valve body (18) is disposed in adjustable manner, with which the amount of flow of a hot gas stream that exits from

the branch line (16) can be regulated. The process gas line (17) has a cooler process gas flowing though it, which cools the valve body (18) and a setting device (19) assigned to the valve body.

The Examiner recognized that none of *Luinstra et al.*, *Bartz et al.*, and *Harris* discloses these features of Appellant's claim 4, and the Examiner relies on the secondary reference to *Wunderlich et al.* as disclosing these features. See page 5, lines 4-11 of the October 26, 2009 Final Office Action. According to the Examiner, it would have been obvious to one of ordinary skill in the art to add the branch line 52 and valve 54 of *Wunderlich et al.* to the reactor of *Luinstra et al.* having a ceramic plate as taught in *Bartz et al.* and having a mantle-fill side opening as taught by *Harris*, in order to control the temperature of the process gas stream to make the process gas stream suitable for downstream Claus reaction processes. See the first full paragraph of page 6 of the October 26, 2009 Final Office Action. See also FIG. 3 of *Wunderlich et al.*

It is respectfully submitted that the Examiner's position is unfounded for the following reasons.

Appellant's invention is set forth in claim 4 relates to an embodiment in which a cooler process gas is passed to the hot gas stream branch out of the outflow-side chamber in order to reduce thermal stresses. Not only does FIG. 3 of *Wunderlich et al.* describe a process that lies completely ahead of a Claus process, but also *Wunderlich*

et al. describes a process in which a process gas is drawn off from the outflow region of a reactor ("exhaust zone 203a"), which gas has a temperature of 1150°C according to Table 3 of *Wunderlich et al.* This hot gas is then passed over a regulation flap (54) that is connected with a temperature control element. See column 7, lines 53 to 56 and column 8, lines 72-75 of *Wunderlich et al.*

A temperature control element is usually an electronic measurement circuit, so it is respectfully submitted that a person skilled in the art recognized, in FIG. 3 of *Wunderlich et al.*, a flap 54 for a hot process gas that controls through-flow, whose degree of opening is adjusted by an electronic temperature control. It is also respectfully submitted that a person skilled in the art recognizes that no mixture of different gas streams is provided at the control flap 54 from the different line thickness that is selected in the figure for the gas-carrying line 52, on the one hand, and the connection line of the temperature control device 53, on the other hand. It is respectfully submitted that even if one were to withdraw a waste gas from the combustion chamber 50 of *Wunderlich et al.* for further regulation, this waste gas would still be hotter, at 1350°C according to Table 3 at III, than the gas being passed through the bypass line 52.

In contrast, the cooling of the gas being branched out of the outflow-side chamber according to Appellant's fission reactor as recited in claim 4 allows the use of metallic materials for the valve body and the setting device as more specifically recited

in claim 6.

Moreover, contrary to the Examiner's position, not only does FIG. 3 of *Wunderlich et al.* nowhere expressly indicate that the shown process contains the Claus process, *Wunderlich et al.* itself expressly indicates at column 8, lines 67-71 of *Wunderlich et al.* that the cooled processed gas of the disclosed process is **thereafter** suitable for use in a Claus furnace. This cooled process gas of *Wunderlich et al.* leaves the waste heat boiler 56 through outlets 59 to **thereafter** be fed to a Claus oven. In accordance with table 3A of *Wunderlich et al.*, the process described in the *Wunderlich et al.* reference produces SO_2 and is merely preparation for a Claus reaction. There is no written description in the *Wunderlich et al.* reference of a Claus reaction. In a Claus reaction, SO_2 is reduced and is not produced. Accordingly, it is respectfully submitted that *Wunderlich et al.* does not give any information about a suitable embodiment of a fission reactor for a Claus plant.

Furthermore, the regulating valve 54 of *Wunderlich et al.* is placed inside the by-pass and is not situated in the opening region of the branch line. The bypass 52 of *Wunderlich et al.* opens into no further separate process gas line, and instead flows directly to the combustion chamber 50. Appellant's fission reactor as recited in claim 4 has a valve body in the opening region of the branch line, in which opening region the branch line opens into a process gas line through which cooler process gas passes so that the valve body can be cooled by the process gas. Due to the flow properties in the

reactor and reaction described in *Wunderlich et al.*, there will be no cooling of the valve 54 by cooled gas during operation of the process of *Wunderlich et al.*

Although the Examiner has taken the position that the valve of *Wunderlich et al.* "will inherently be cooled by the process gas due to its close proximity to the process gas (such as radiation)" (February 16, 2010 Advisory Action), this position ignores the placement of *Wunderlich et al.*'s regulating valve 54 inside bypass 52 containing gas leaving discharge 203a that is not cooled in waste heat vessel 212 so any cooling due to proximity to short pipe 215 would be minimal. See *Wunderlich et al.* column 7, lines 37-56.

In fact, no cooling may result at all so it is respectfully submitted that cooling of the valve is not "inherent" in *Wunderlich et al.* Nor is there anything in *Wunderlich et al.* that expressly or implicitly teaches that the valve should be cooled. Even if such cooling were to be considered inherent due to the proximity of the valve to shortpipe 215, that which may be inherent is not necessarily known, and obviousness cannot be predicted on what is unknown. In re Rijckaert, 28 U.S.P.Q.2d 1955, 1959 (Fed. Cir. 1993).

Moreover, contrary to the Examiner's position, claim 4 specifies that valve body 18 is disposed in the opening region of the branch line which opens into a process gas line through which cooler process gas passes. Thus the valve body due to its

placement in the region where the branch line and process gas line meet necessarily is contacted by the flow of the cooler gas through the process gas line contrary to *Wunderlich et al.*'s arrangement wherein regulation flap 54 is contacted solely by the uncooled gas leaving discharge chamber 203a in bypass 52.

Thus, it is not simply a question whether the recitation in claim 4 that "a cooler process gas passes through the process gas line (17), which cools the valve body (18) and a setting device (19) assigned to the valve body" is directed to the manner of operating the apparatus and need not be disclosed in *Wunderlich et al.* as asserted by the Examiner. Rather, the issue is whether *Wunderlich et al.* discloses or suggests the structural arrangement of a valve body placed in the opening region of the branch line which opens into a process gas line as recited in claim 4 so that the cooler process gas passing through the process gas line cools the valve body and the setting device.

Accordingly, it is respectfully submitted that claim 4, and claim 5 which depend thereon, are patentable over the cited references for these additional reasons.

The Rejection of Claim 6 Under 35 U.S.C. §103(a) as Being Unpatentable Over *Luinstra et al.* in view of *Bartz et al., Harris,* and *Wunderlich et al.* and Further in View of *Nobuhiro et al. JP 06-200354* Was in Error.

As to dependent claim 6, which depends from claim 4 which depends from claim 1, the Examiner has based his rejection under 35 U.S.C. §103(a) on a combination of *Luinstra et al., Bartz et al., Harris,* and *Wunderlich et al.* with the further reference *Nobuhiro et al.*, citing *Nobuhiro et al.* as disclosing a valve used in high temperature service constructed "of a metallic material (see abstract) in order to improve the valve strength at high temperatures as well as reducing fatigue of the material (see abstract)." October 26, 2009 Office Action at 7.

Luinstra et al., Bartz et al., Harris and *Wunderlich et al.* have been discussed above, and it is respectfully submitted that the arguments with respect to *Luinstra et al., Bartz et al., Harris* in connection with claim 1 on which claim 6 indirectly depends and with regard to *Wunderlich et al.* with respect to claim 4 on which claim 6 depends apply equally to the combination of *Luinstra et al., Bartz et al., Harris* and *Wunderlich et al.* with *Nobuhiro et al.*

For example, as discussed above, the cooling of gas being branched out of the outflow-side chamber allows the use of metallic materials for the valve body and the setting device as recited in Appellant's claim 6. There is no disclosure or suggestion in *Nobuhiro et al.* of a branch line, from an outflow-side chamber of a boiler, opening into

a process gas line having cooler process gas flowing through. *Nobuhiro et al.* simply discloses a valve made of a particular composition of steel that includes C, Si, Mn, Cr, Ni, V, N, and Fe.

Moreover, *Nobuhiro et al.* fails to disclose any bricks, let alone a catalyst chamber delimited on both sides, in a flow direction, by a plurality of gas permeable checker bricks containing elongated holes, or a mantle-side fill opening disposed between the gas-permeable chamber bricks for introducing the catalyst bed. Further, there is nothing in *Nobuhiro et al.* that would teach one skilled in the art to make the combination of *Luinstra et al.*, *Bartz et al.*, *Harris*, and *Wunderlich et al.* with each other, let alone the combination of these references with *Nobuhiro et al.*

Accordingly, it is respectfully submitted that like Appellant's other claims, claim 6 is patentable over the cited prior art references.

CONCLUSION

In view of the above, Appellant respectfully submits that it is entitled to a patent incorporating claims 1-2 and 4-7. A Claims Appendix containing a copy of the claims involved in the appeal is attached to the brief. Evidence and Related Proceedings Appendices are also attached, indicating "None." A remittance of $540.00 in payment of the official fee for a Large Entity is attached. Fee deficiencies or overpayments, if any, should be charged or credited to Deposit Account No. 03-2468.

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Enclosures: Claims Appendix, Evidence Appendix, Related Proceedings Appendix
Check in the amount of $ 540.00

I hereby certify that this correspondence is being deposited with the U.S. Postal Service as first class mail in an envelope addressed to: Commissioner of Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on May 21, 2010.

Amy Klein

Amy Klein

CLAIMS APPENDIX

Claims 1-2 and 4-7

Claim 1: Fission reactor for a Claus plant, comprising a boiler (9) lined with refractory material, which comprises a combustion chamber (2) having an inflow opening (12) for a mixture of heating gas, air and acid gas containing H_2S, a catalyst chamber (10) having a catalyst bed (3) of a loose catalyst bulk material, and an outflow-side chamber (11) having a gas outlet (13) for hot process gas containing elemental sulfur, wherein the boiler (9) is configured as a horizontal cylindrical boiler, in which the combustion chamber (2), the catalyst chamber (10), and the outflow-side chamber (11) are disposed next to one another, and wherein the catalyst chamber (10) is delimited, on both sides, in the flow direction, by a plurality of gas-permeable checker bricks (14) containing elongated holes, and has a mantle-side fill opening (15) disposed between the gas-permeable checker bricks (14) for introducing the catalyst bed (3).

Claim 2: Fission reactor as claimed in claim 1, wherein the inflow opening (12) and the gas outlet (13) are disposed on opposite faces of the boiler (9).

Claim 4: Fission reactor as claimed in claim 1, wherein on the circumference of the outflow-side chamber (11), a branch line (16) lined with refractory material is

connected, which opens into a process gas line (17) adjacent to the boiler (9), in the opening region of the branch line (16), a valve body (18) is disposed in adjustable manner, with which the amount flow of a hot gas stream that exits from the branch line (16) can be regulated, and a cooler process gas passes through the process gas line (17), which cools the valve body (18) and a setting device (19) assigned to the valve body.

Claim 5: Fission reactor as claimed in claim 4, wherein a waste heat boiler (4) is connected with the gas outlet (13), in which the hot process gas that exits from the boiler (9) is cooled for the condensation of elemental sulfur, and steam is generated, and wherein the branch line (16) opens into a process gas line (17) that is connected with the waste heat boiler (4) and passes the cooled process gas to a catalyst stage (5) of the Claus plant.

Claim 6: Fission reactor as claimed in claim 4, wherein said valve body and said setting device consist of metallic material.

Claim 7: Fission reactor as claimed in claim 1, wherein said mantle-side fill opening comprises a flange tube.

EVIDENCE APPENDIX

None

RELATED PROCEEDINGS APPENDIX

None